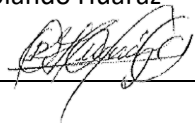


# FQM Cobre Panama - Standard Operating Procedure

|                |                                                                                        |                |                                                                                     |
|----------------|----------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------|
| Subject:       | Medición de Reología en muestras de Concentrado utilizando el Viscotester iQ de HAAKE. | S.O.P. No:     | PP OPS-SRV-POE-34                                                                   |
| Date:          | 1 de Agosto 2021                                                                       | Revision date: | 12/06/2023                                                                          |
| Drafted by:    | Mireya Ahumada                                                                         | Approved by:   | Rolando Huaraz                                                                      |
| Revised by:    | David Camarena                                                                         |                |  |
| File location: | <a href="#">Thickeners - All Documents</a>                                             |                |                                                                                     |

|                                                                                                                                      |                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>La Tarea</b></p> <p>Medir la Reologia del concentrado final que será enviado a través del tubo de transporte hacia Puerto.</p> | <p><b>The Task</b></p> <p>Measure the rheology of the final concentrate that will be sent through the transport tube to the port.</p> |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|

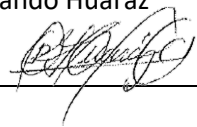
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| <p><b>Principales Peligros</b></p> <ul style="list-style-type: none"> <li>• Eléctrica (motores).</li> <li>• Química (reactivos).</li> </ul>                                                                                | <p><b>Main Hazards</b></p> <ul style="list-style-type: none"> <li>• Eléctrica (motors).</li> <li>• Chemical (reagents).</li> </ul>                                                                                |
| <p><b>Precauciones</b></p> <ul style="list-style-type: none"> <li>• Personal calificado.</li> <li>• Procedimientos / guías.</li> <li>• Mantenimiento periódico.</li> <li>• Verificación diaria.</li> <li>• EPP.</li> </ul> | <p><b>Precautions</b></p> <ul style="list-style-type: none"> <li>• Qualified personnel.</li> <li>• Procedures/guides.</li> <li>• Scheduled maintenance.</li> <li>• Daily verification.</li> <li>• PPE.</li> </ul> |

|                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
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|                                                                                     |                                                                                     |                                                                                     |                                                                                     | ✓                                                                                   |                                                                                     |                                                                                     | ✓                                                                                   |                                                                                     | ✓                                                                                   |                                                                                      |                                                                                       |                                                                                       | ✓                                                                                     | ✓                                                                                     |                                                                                       |

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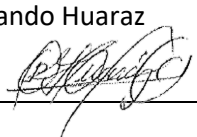
# FQM Cobre Panama - Standard Operating Procedure



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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Objetivo</b><br><p>Establecer los lineamientos para medir la Reología de una muestra de pulpa de concentrado utilizando el Reómetro.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>1. Objective</b><br><p>Establish guidelines for measuring the Rheology of a concentrate pulp sample using a Reometro.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>2. Alcance</b><br><p>Este SOP aplica cada vez que se requiera medir la Reología de una pulpa de concentrado.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>2. Scope</b><br><p>This SOP applies every time it is required to measure the Rheology of a final concentrate sample.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>1. Responsabilidades</b><br><p><b>Supervisor</b></p> <ul style="list-style-type: none"> <li>✓ Supervisar y asegurar el cumplimiento del presente procedimiento.</li> <li>✓ Planificar, designar al personal y analizar las condiciones de seguridad del personal y de los equipos a operar.</li> <li>✓ Coordinar esta tarea, para garantizar una ejecución segura y exitosa.</li> <li>✓ Realizar la medición de la Reología y reportarla en el informe correspondiente.</li> </ul> <p><b>Operador</b></p> <ul style="list-style-type: none"> <li>✓ Inspección pre operacional y de seguridad.</li> <li>✓ Asegurar que las condiciones sean seguras en el área de trabajo.</li> </ul> | <b>3. Responsibilities</b><br><p><b>Supervisor</b></p> <ul style="list-style-type: none"> <li>✓ Supervise and ensure compliance with this procedure.</li> <li>✓ Plan, appoint personnel and analyze the safety conditions of personnel and equipment to operate.</li> <li>✓ Coordinate this task, to ensure a safe and successful execution.</li> <li>✓ Carry out the measurement of the Rheology and report it in the corresponding report.</li> </ul> <p><b>Operator</b></p> <ul style="list-style-type: none"> <li>✓ Pre operational and safety inspection.</li> <li>✓ Ensure that conditions are safe in the work area.</li> </ul> |

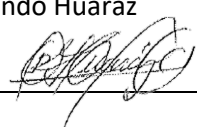
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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>✓ Reportar cualquier condición fuera de estándar, tanto en seguridad como en la condición de los equipos.</li> <li>✓ Mantener la limpieza del sistema y de los equipos, tener ordenado los materiales del área.</li> <li>✓ Tomar la muestra de concentrado aproximadamente 1 litro en un recipiente adecuado y etiquetarlo con fecha y hora.</li> <li>✓ Lavar el exterior del recipiente para evitar escurrimientos.</li> </ul>                                                                       | <ul style="list-style-type: none"> <li>✓ Report any conditions outside the standard, both in safety and in the condition of the equipment.</li> <li>✓ Maintain the cleanliness of the system and equipment; keep the area materials in order.</li> <li>✓ Take the concentrate sample approximately 1 liert in a suitable container and label it with the date and time.</li> <li>✓ Wash the outside of the container to avoid runoff.</li> </ul>                                                                                             |
| <b>4. Requerimientos</b><br><b>Personal</b> <ul style="list-style-type: none"> <li>✓ Operador</li> <li>✓ Supervisor</li> </ul> <b>EPP</b> <ul style="list-style-type: none"> <li>✓ Especifico del area.</li> </ul> <b>Materiales, Herramientas y Equipos</b> <ul style="list-style-type: none"> <li>✓ Envase para la muestra con tapa 1 l</li> <li>✓ Balanza Marcy</li> <li>✓ Vasos precipitados , 200 ml</li> <li>✓ Viscosimetro para medir Reologia</li> <li>✓ Agitador magnetico</li> <li>✓ Barra magnetica</li> <li>✓ Phmetro</li> </ul> | <b>3. Requirements</b><br><b>Personnel</b> <ul style="list-style-type: none"> <li>✓ Operator</li> <li>✓ Supervisor</li> </ul> <b>PPE</b> <ul style="list-style-type: none"> <li>✓ Area specific.</li> </ul> <b>Materials, Tools and Equipment.</b> <ul style="list-style-type: none"> <li>✓ Sample container with lid 1 l</li> <li>✓ Marcy scale</li> <li>✓ Beakers, 200 ml</li> <li>✓ Viscometer to measure Rheology</li> <li>✓ Magnetic stirrer</li> <li>✓ Magnetic bar</li> <li>✓ Phmeter</li> <li>✓ Washing bottle with water</li> </ul> |

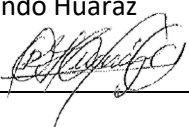
# FQM Cobre Panama - Standard Operating Procedure



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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ✓ Frasco lavador con agua                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>5. Descripción general</b><br>Este procedimiento contempla los siguientes pasos generales: <ul style="list-style-type: none"> <li>➤ Muestreo de la pulpa de concentrado.</li> <li>➤ Medición de la Reología.</li> <li>➤ Calculus y graficas.</li> </ul>                                                                                                                                                                                                                                                                                     | <b>5. General Description</b><br>The procedure includes following general steps: <ul style="list-style-type: none"> <li>➤ Sampling pulp concentrate.</li> <li>➤ Rheology Measurement.</li> <li>➤ Calculations and graphs</li> </ul>                                                                                                                                                                                          |
| <b>6. Peligros/Riesgos/Controles inherentes a este procedimiento.</b><br><br>✓ <b>Peligros:</b> derrame de concentrados, pisos resbalosos, superficies desniveladas, obstáculos en la vía, equipos energizados, partes rotativas etc.<br><br>✓ <b>Riesgos:</b> resbalones, caídas a nivel y a desnivel, fracturas, contusiones, heridas, quemaduras, contacto con reactivo, electrocución, atrapamiento, proyección de partículas. etc.<br><br>✓ <b>Controles:</b> no correr, usar sus EPP, área limpia y ordenada, seguir este procedimiento. | <b>6. Dangers/risks/controls inherent to this procedure.</b><br><br>✓ <b>Hazards;</b> reagent leak, slippery floors, uneven surfaces, obstacles on the walkway, sharp objects, energized equipment, rotary parts, etc.<br><br>✓ <b>Risks;</b> slips trips, falls, contusions, reagent contact, electrocution, entrapment, etc.<br><br>✓ <b>Controls;</b> not run, correct use of the stairs, PPE use, follow this procedure. |
| <b>7. Procedimiento.</b><br><br><b>Toma de muestra.</b><br><br>✓ El operador del área espesadores deberá tomar aprox. 1 l de muestra de concentrado final de cobre.                                                                                                                                                                                                                                                                                                                                                                            | <b>7. Procedure.</b><br><br><b>Sampling.</b><br><br>✓ The thickener area operator should take approximately 1 liter of final copper concentrate sample.                                                                                                                                                                                                                                                                      |

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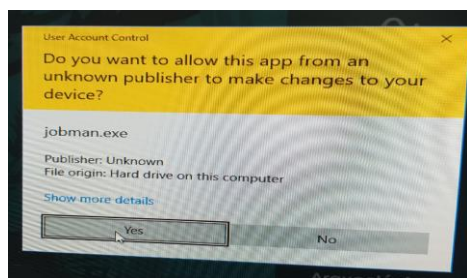
- ✓ La muestra debe ser tomada a la salida del filtro de la bomba de carga o en la recirculación.
- ✓ Etiquetar el envase con nombre de área, fecha, hora, punto de muestreo.

## Medición de la Reología

- ✓ Encienda el computador asociado al equipo e ingrese la clave de usuario.
- ✓ Con botón derecho del mouse presione el programa a ejecutar como administrador.



- ✓ Presione Yes



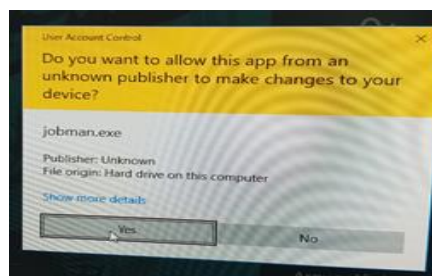
- ✓ The sample can be taken at the filter outlet of the loading pump or in the recirculation.
- ✓ Label the container with area name, date, time, sampling point.

## Rheology Measurement

- ✓ Turn on the computer associated with the equipment and enter the user password.
- ✓ Right-click the program to run as administrator.



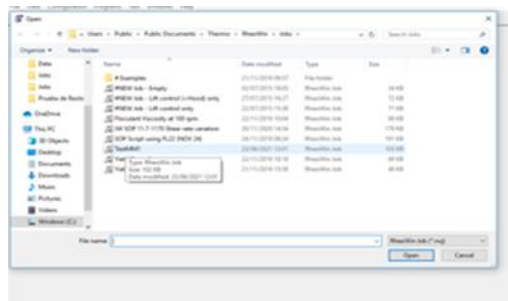
- ✓ Press Yes



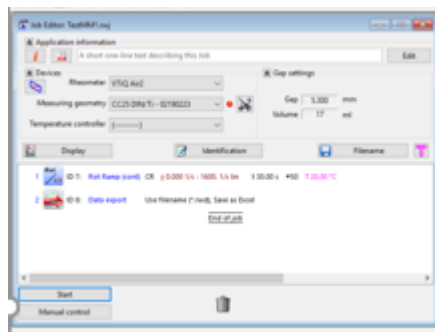
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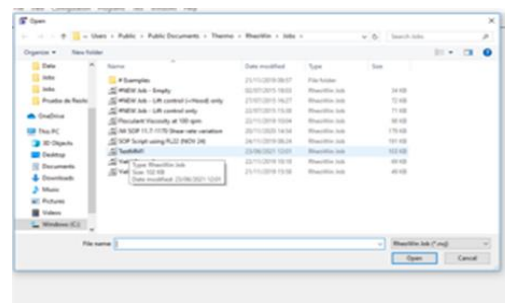
## ✓ Selecciones TestMM1



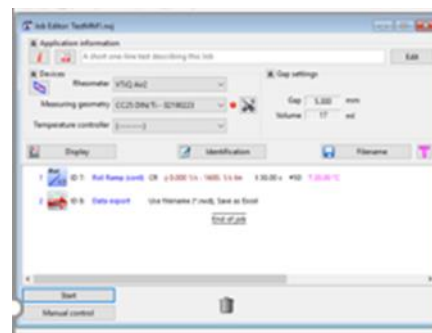
- ✓ Se despliega la pantalla con el programa a ejecutar, está programado que la velocidad de corte [1/s] llegue hasta 1600, lea 50 datos en 30 s. Estos parámetros se pueden variar dependiendo de las características de la pulpa como % de sólido y granulometría.



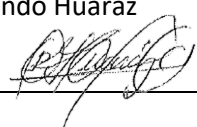
## ✓ Selections TestMM1



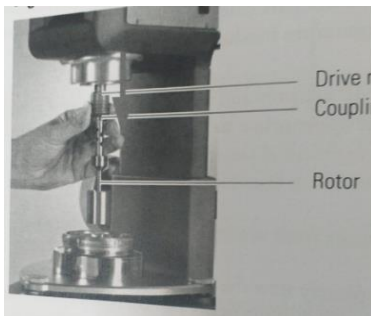
The screen with the program to be executed is displayed, the cutting speed [1 / s] is programmed to reach 1600, read 50 data in 30 s. These parameters can be varied depending on the characteristics of the pulp such as % solid and granulometry.



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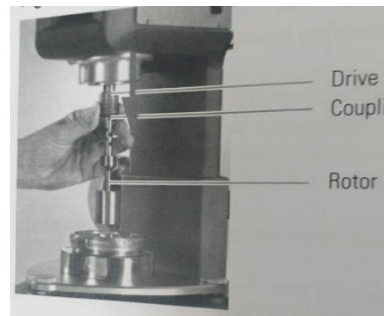
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- ✓ Instale el rotor con el tubo los cuales deben estar limpios y secos.



- ✓ Verifique el estado del Compresor, debe marcar una presión de 2 Bar, purgar la válvula para eliminar el agua acumulada.
- ✓ Encienda el Reómetro presionando el botón instalado en un costado del equipo, espere que el equipo realice el check del sistema.
- ✓ Si al encender el equipo aparece un mensaje con letras de color rojo que dice **Please remove geometry to continue**, se detecta una geometría de medición en el eje de transmisión del reómetro en este punto, el instrumento emitirá una señal acústica y el texto, elimine la geometría para continuar, se mostrará en la pantalla en caracteres de color rojo. En este caso, la geometría de medición debe eliminarse para continuar con el proceso de inicialización. Para eliminarla, revise que el compresor esté funcionando, apague el equipo, retire el rotor,

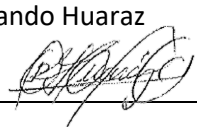
- ✓ Install the rotor with the tube which must be clean and dry.



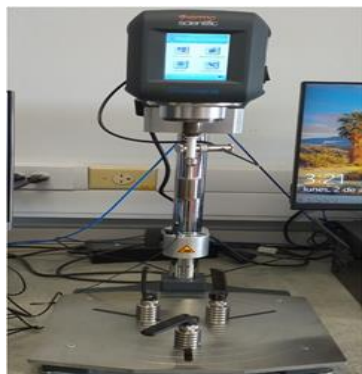
- ✓ Check the condition of the Compressor; it should mark a pressure of 2 Bar, bleed the valve to eliminate the accumulated water.
- ✓ Turn on the Reometer by pressing the button installed on the side of the equipment, wait for the equipment to perform the system check.
- ✓ If when turning on the equipment a message appears with red letters that says Please remove geometry to continue, a measurement geometry is detected in the Reometer transmission shaft at this point, the instrument will emit an acoustic signal and the text, delete geometry to continue, it will be displayed on the screen in red characters. In this case, the measurement geometry must be removed to continue with the initialization process. To eliminate it, check that the compressor is working, turn off the equipment, remove the rotor, turn on the equipment, it starts, wait 5 minutes until



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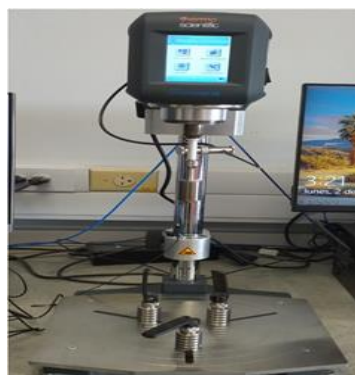
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encienda el equipo, se inicia, se esperan 5 minutos hasta que reinicie completamente y aparezca la pantalla que muestra la foto.



- ✓ La muestra se debe repartir en 3 vasos precipitados de 200 ml c/u, debe agitar el frasco y vaciar en cada vaso una porción de la muestra, se vuelve agitar el frasco y nuevamente se reparte en los 3 vasos y así sucesivamente hasta llegar a un volumen de aproximadamente 200 ml. Cada muestra debe estar bien agitada antes de instalarla en el Reómetro, utilizar agitador magnético si es necesario, hay que evitar la sedimentación y asegurar que la muestra este homogénea con todos los sólidos en suspensión.
- ✓ Instalar el vaso con la muestra en el centro de la base del equipo y bajar el rotor con el tubo hasta que la ranura del tubo quede sumergida en la pulpa.

it fully restarts and the screen shown in the photo appears.



- ✓ The sample must be divided into 3 beakers of 200 ml each, you must shake the bottle and empty a portion of the sample into each glass, shake the bottle again and again it is distributed among the 3 glasses and so on until reaching at a volume of approximately 200 ml. Each sample must be well agitated before installing it in the Rheometer, use a magnetic stirrer if necessary, avoid sedimentation and ensure that the sample is homogeneous with all the solids in suspension.
- ✓ Install the beaker with the sample in the center of the equipment base and lower the rotor with the tube until the tube groove is submerged in the pulp.
- ✓ Press start measurement.



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- ✓ Apretar comenzar la medición.
- ✓ A los 30 s el rotor se detiene y el programa solicita grabar el archivo.
- ✓ Retirar el tubo con el rotor, lavar, secar e instalar para una nueva medición.
- ✓ Los datos obtenidos deben ser ingresados en planilla Excel donde se promedian los tres valores de Shear Stress (Pa) para cada Shear Rate (1/s), y se grafica mediante regresión lineal Shear Stress v/s Shear Rate, originando una ecuación de la recta cuya variable independiente es Shear Rate (eje x) y la variable dependiente es Shear Stress (eje y). De esta ecuación de la recta " $y = ax + b$ " se obtiene la viscosidad en [cP] y el esfuerzo de corte en [dyna/cm<sup>2</sup>] de la siguiente manera:
- ✓ La pendiente "a" multiplicada por 1000 se obtiene la viscosidad.
- ✓ A la distancia desde el origen al punto de intercepción con el eje y, "b" multiplicado por 10, se obtiene el esfuerzo de corte.
- ✓ A la misma muestra realizar análisis granulométrico (master Size), Ph, gravedad específica, medir temperatura y pH, registrar en tabla resumen.

### 8. Definiciones

- ✓ **Reología:** La reología se define como la ciencia que estudia la deformación y el

- ✓ After 30 s the rotor stops and the program asks to save the file.
- ✓ Remove the tube with the rotor, wash, dry and install for a new measurement.
- ✓ The data obtained must be entered in an Excel spreadsheet where the three values of Shear Stress (Pa) are averaged for each Shear Rate (1 / s), and it is graphed by linear regression Shear Stress v / s Shear Rate, originating an equation of the line whose independent variable is Shear Rate (x-axis) and the dependent variable is Shear Stress (y-axis). From this equation of the line " $y = ax + b$ " we obtain the viscosity in [cP] and the shear stress in [dyne / cm<sup>2</sup>] as follows:
- ✓ The slope "a" multiplied by 1000 gives the viscosity.
- ✓ At the distance from the origin to the interception point with the y-axis, "b" multiplied by 10, the shear stress is obtained.
- ✓ On the same sample, perform a granulometric analysis, pH, temperature and record in a summary table.

### 8. Definitions

- ✓ **Rheology:** Rheology is defined as the science that studies the deformation and flow of

## FQM Cobre Panama - Standard Operating Procedure



|                |                                                                                        |                |                                                                                     |
|----------------|----------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------|
| Subject:       | Medición de Reología en muestras de Concentrado utilizando el Viscotester iQ de HAAKE. | S.O.P. No:     | PP OPS-SRV-POE-34                                                                   |
| Date:          | 1 de Agosto 2021                                                                       | Revision date: | 12/06/2023                                                                          |
| Drafted by:    | Mireya Ahumada                                                                         | Approved by:   | Rolando Huaraz                                                                      |
| Revised by:    | David Camarena                                                                         |                |  |
| File location: | <a href="#">Thickeners - All Documents</a>                                             |                |                                                                                     |

flujo de la materia, esto es como un material responde a una fuerza.

- ✓ **Reómetro:** Instrumento que se utiliza para estudiar las propiedades de medición de la Reología.
- ✓ **Viscosidad:** Es la resistencia al movimiento que presenta un fluido cuando está en movimiento. Se define como la relación entre el esfuerzo de corte aplicado y la velocidad de corte adoptada por el fluido, se expresa en cent poise [c P].
- ✓ **Velocidad de Corte o cizalla:** Se define como el cambio de velocidad a través de la distancia entre los dos platos, las unidades son [1/se]. La velocidad de corte se incrementa a medida que la velocidad del plato superior aumenta y la distancia entre los 2 platos se hace más pequeña.
- ✓ **Esfuerzo de corte o cizalla:** El esfuerzo de corte o cizalla se define como la fuerza por unidad de área necesaria para alcanzar una deformación dada, las unidades de esta magnitud son [Dinas/cm2].

matter, this is how a material responds to a force.

- ✓ **Rheometer:** An instrument used to study the measurement properties of Rheology.
- ✓ **Viscosity:** It is the resistance to movement that a fluid has when it is in motion. It is defined as the relationship between the applied shear stress and the shear speed adopted by the fluid, expressed in cent poise [c P].
- ✓ **Shear or cutting speed:** It is defined as the change in speed through the distance between the two plates, the units are [1 / se]. The cutting speed increases as the speed of the top plate increases and the distance between the 2 plates becomes smaller.
- ✓ **Shear or shear stress:** The shear or shear stress is defined as the force per unit area necessary to achieve a given deformation, the units of this magnitude are [Dynes/ cm2].

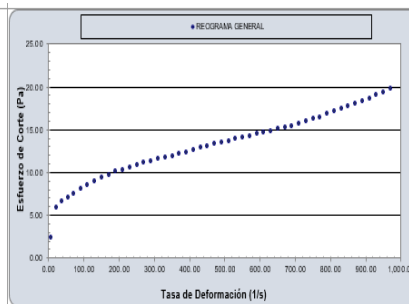
# FQM Cobre Panama - Standard Operating Procedure



|                |                                                                                        |                |                   |
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## Plantilla de calculos y graficos:

| DATOS DIRECTOS DEL REOMETRO |           |           |           | DATOS INICIALES           |                        |                   | DATOS DEPURADOS           |                        |
|-----------------------------|-----------|-----------|-----------|---------------------------|------------------------|-------------------|---------------------------|------------------------|
| N de Orden                  | GP in 1/s | Tau in Pa | Eta in cP | Tasa de Deformación [1/s] | Esfuerzo de Corte [Pa] | Viscosidad [Pa.s] | Tasa de Deformación [1/s] | Esfuerzo de Corte [Pa] |
| 1                           | 5.202     | 2.397     | 454.7     | 5.28                      | 2.31                   | 0.437             | 5.282                     |                        |
| 2                           | 21.65     | 5.025     | 236.7     | 21.05                     | 5.83                   | 0.277             | 21.05                     |                        |
| 3                           | 37.73     | 6.626     | 175.4     | 37.73                     | 6.63                   | 0.176             | 37.73                     |                        |
| 4                           | 54.60     | 7.191     | 129.9     | 54.68                     | 7.10                   | 0.130             | 54.68                     |                        |
| 5                           | 71.74     | 7.577     | 105.5     | 71.74                     | 7.54                   | 0.105             | 71.74                     |                        |
| 6                           | 89.02     | 8.002     | 89.22     | 90.82                     | 8.01                   | 0.088             | 90.82                     |                        |
| 7                           | 106.6     | 8.485     | 76.74     | 110.60                    | 8.49                   | 0.077             | 110.6                     |                        |
| 8                           | 124.5     | 8.972     | 66.74     | 130.50                    | 8.97                   | 0.069             | 130.5                     |                        |
| 9                           | 156.5     | 9.364     | 62.23     | 150.50                    | 9.37                   | 0.062             | 150.5                     |                        |
| 10                          | 176.5     | 9.749     | 57.80     | 170.50                    | 9.75                   | 0.057             | 170.5                     |                        |
| 11                          | 196.5     | 10.00     | 52.4      | 190.50                    | 10.08                  | 0.053             | 190.5                     |                        |
| 12                          | 216.5     | 10.34     | 48.15     | 210.50                    | 10.34                  | 0.049             | 210.5                     |                        |
| 13                          | 236.5     | 10.64     | 46.36     | 230.50                    | 10.64                  | 0.046             | 230.5                     |                        |
| 14                          | 256.5     | 10.93     | 45.40     | 250.50                    | 10.88                  | 0.043             | 250.5                     |                        |
| 15                          | 276.5     | 11.00     | 44.90     | 270.50                    | 11.08                  | 0.041             | 270.5                     |                        |
| 16                          | 296.5     | 11.35     | 39.80     | 290.50                    | 11.35                  | 0.039             | 290.5                     | 11.35                  |
| 17                          | 316.5     | 11.54     | 37.02     | 310.80                    | 11.54                  | 0.037             | 310.8                     | 11.54                  |
| 18                          | 336.5     | 11.72     | 35.42     | 330.80                    | 11.72                  | 0.035             | 330.8                     | 11.72                  |
| 19                          | 356.5     | 11.95     | 34.07     | 350.80                    | 11.95                  | 0.034             | 350.8                     | 11.95                  |
| 20                          | 376.5     | 12.16     | 32.70     | 370.80                    | 12.16                  | 0.033             | 370.8                     | 12.16                  |
| 21                          | 396.5     | 12.36     | 31.63     | 390.80                    | 12.36                  | 0.032             | 390.8                     | 12.36                  |
| 22                          | 416.5     | 12.59     | 30.64     | 410.80                    | 12.59                  | 0.031             | 410.8                     | 12.59                  |
| 23                          | 436.5     | 12.84     | 29.76     | 430.80                    | 12.84                  | 0.030             | 430.8                     | 12.84                  |
| 24                          | 456.5     | 13.05     | 28.95     | 450.80                    | 13.05                  | 0.029             | 450.8                     | 13.05                  |
| 25                          | 476.5     | 13.29     | 28.23     | 470.80                    | 13.29                  | 0.028             | 470.8                     | 13.29                  |
| 26                          | 496.5     | 13.51     | 27.62     | 490.80                    | 13.51                  | 0.028             | 490.8                     | 13.51                  |
| 27                          | 516.5     | 13.63     | 26.70     | 510.80                    | 13.68                  | 0.027             | 510.8                     | 13.68                  |
| 28                          | 536.5     | 13.81     | 26.36     | 530.80                    | 13.88                  | 0.026             | 530.8                     | 13.88                  |
| 29                          | 556.5     | 14.06     | 25.82     | 550.80                    | 14.06                  | 0.026             | 550.8                     | 14.06                  |
| 30                          | 576.5     | 14.26     | 24.90     | 570.80                    | 14.26                  | 0.025             | 570.8                     | 14.26                  |
| 31                          | 596.5     | 14.47     | 24.5      | 590.80                    | 14.47                  | 0.025             | 590.8                     | 14.47                  |
| 32                          | 616.5     | 14.65     | 23.99     | 610.80                    | 14.65                  | 0.024             | 610.8                     | 14.65                  |
| 33                          | 636.5     | 14.84     | 23.82     | 630.80                    | 14.84                  | 0.024             | 630.8                     | 14.84                  |
| 34                          | 656.5     | 15.03     | 23.4      | 650.80                    | 15.03                  | 0.023             | 650.8                     | 15.03                  |
| 35                          | 676.5     | 15.21     | 22.67     | 670.80                    | 15.21                  | 0.023             | 670.8                     | 15.21                  |
| 36                          | 696.5     | 15.45     | 22.37     | 690.80                    | 15.45                  | 0.022             | 690.8                     | 15.45                  |
| 37                          | 716.5     | 15.67     | 22.05     | 710.80                    | 15.67                  | 0.022             | 710.8                     | 15.67                  |
| 38                          | 736.5     | 15.92     | 21.70     | 730.80                    | 15.92                  | 0.022             | 730.8                     | 15.92                  |
| 39                          | 756.5     | 16.22     | 21.4      | 750.80                    | 16.22                  | 0.022             | 750.8                     |                        |
| 40                          | 776.5     | 16.49     | 21.4      | 770.80                    | 16.49                  | 0.021             | 770.8                     |                        |
| 41                          | 796.5     | 16.3      | 21.24     | 790.80                    | 16.80                  | 0.021             | 790.8                     |                        |
| 42                          | 816.5     | 17.11     | 21.5      | 810.80                    | 17.11                  | 0.021             | 810.8                     |                        |
| 43                          | 836.5     | 17.37     | 20.9      | 830.80                    | 17.37                  | 0.021             | 830.8                     |                        |
| 44                          | 856.5     | 17.69     | 20.79     | 850.80                    | 17.69                  | 0.021             | 850.8                     |                        |
| 45                          | 876.5     | 18.01     | 20.69     | 870.80                    | 18.01                  | 0.021             | 870.8                     |                        |
| 46                          | 896.5     | 18.3      | 20.94     | 890.80                    | 18.30                  | 0.021             | 890.8                     |                        |
| 47                          | 916.5     | 18.67     | 20.5      | 910.80                    | 18.67                  | 0.021             | 910.8                     |                        |
| 48                          | 936.5     | 19.01     | 20.42     | 930.80                    | 19.01                  | 0.020             | 930.8                     |                        |
| 49                          | 956.5     | 19.34     | 20.34     | 950.80                    | 19.34                  | 0.020             | 950.8                     |                        |
| 50                          | 976.5     | 19.73     | 20.33     | 970.50                    | 19.73                  | 0.020             | 970.5                     |                        |



| Y. Stress [Pa] | Viscosity [Pa.s] | Y. Stress dinas/cm2 | Viscosity [cP] |
|----------------|------------------|---------------------|----------------|
| 8.36735        | 0.01030          | 83.67               | 10.30          |

